

WHAT IS CLAIMED IS:

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1. In a communication system that includes a plurality of nodes that communicate over a plurality of radio channels including a control channel and a plurality of data channels, a method of communicating between a source and a destination node among the plurality of nodes comprising the steps of:

(a) monitoring the control channel to determine the availability of each of the plurality of data channels;

(b) negotiating an agreement between the source and destination node over the control channel to accept one of the plurality of available data channels for conducting communications;

(c) conducting communications between the source and destination nodes over the accepted data channel;

(d) releasing the accepted data channel; and

(e) informing the others of the plurality of nodes upon completion of communications that the accepted data channel has been released.

2. The method of Claim 1, wherein the control channel is monitored at each of the plurality of nodes.

3. The method of Claim 2, further comprising the step of:  
storing the most recent information regarding the availability of the data channels in databases located at each of the source and destination nodes.

4. The method of Claim 1, wherein the step of negotiating an agreement comprises the following steps:

(i) broadcasting from the source node over the control channel a request to use one of the plurality of data channels for communications with the destination node;

(ii) broadcasting from the destination node over the control channel either an acceptance of the request to use one of the plurality of data channels for communications or a request to use an alternative one of the plurality of data channels for communications; and

(iii) broadcasting from the source node over the control channel, if the one of the plurality of data channels was not accepted, either an acceptance of the alternative channel or a request to use another one of the plurality of data channels for communications, the source and destination nodes continuing to alternately request different data channels until a data channel is accepted.

5. The method of Claim 4, further comprising the step of informing the others of the plurality of nodes that the accepted data channel is no longer available for communications.

6. The method of Claim 4, wherein the acceptance of a data channel by a node depends upon information retained by the node about the status of the requested channel.

7. The method of Claim 6, wherein the information is retained in a database located at the node.

8. The method of Claim 4, wherein the source node and the destination node each include a first and second database, the first database containing a list of available data channels, the second database containing a list of potentially available data channels, wherein during the step of negotiating an agreement the data channels in the first databases are selected by source and destination nodes for the requests to use before the data channels in the second databases.

9. The method of Claim 8, wherein the availability of the data channels is based upon information received at the nodes and the method further comprises the step of sorting the data channels in the first and second databases according to the timeliness of the information indicating the availability of the data channels.

10. In a communication system that includes a plurality of nodes, a plurality of radio channels including a control channel and a plurality of data channels, each of the nodes capable of transmitting and receiving data packets from another one of the nodes over one of the radio channels, the control channel being available for transmission of control packets from any of the plurality of nodes, a method of controlling access to the control channel in order to minimize collisions between control packets comprising the steps of:

(a) receiving a control packet transmitted over the control channel at one of the plurality of nodes requiring access to the control channel; and

(b) inhibiting transmission over the control channel from the node requiring access for a predetermined amount of time after the receipt of a control packet sufficient to allow the node addressed by the control packet to transmit a responsive control packet, thereby minimizing collisions between control packets on the control channel.

11. The method of Claim 10, further comprising the steps of dividing the control channel into a series of major time slots; and  
dividing each major time slot into a series of mini-slots,  
wherein the predetermined amount of time corresponds to the duration of a major time slot.

12. The method of Claim 11, wherein the node addressed by the control packet transmits a responsive control packet in the first mini-slot within the major slot immediately following receipt of the control packet.

13. The method of Claim 11, further comprising the step of assigning the node requiring access to a mini-slot within the first major slot following transmission of the responsive control packet.

14. The method of Claim 13, wherein the step of assigning is based on the priority of the packet by the node requiring access.

15. The method of Claim 11, wherein the number of mini-slots equals the number of nodes.

16. In a communication system that includes a plurality of nodes, a plurality of radio channels including a control channel and a plurality of data channels, each of the nodes capable of transmitting or receiving packets from another one of the nodes over one of the radio channels, the control channel being available for transmissions of requesting and responsive control packets from any of the plurality of nodes, a method of controlling access to the control channel in order to minimize collisions between control packets comprising the steps of:

- (a) dividing the control channel into a series of time frames;
- (b) dividing each of the time frames into a plurality of time slots;
- (c) assigning each of the time slots to one of the plurality of nodes; and
- (d) transmitting requesting control packets only in the time slot assigned to the transmitting node.

17. The method of Claim 16, wherein each time slot is approximately twice as long in duration as the time necessary to transmit a control packet.

18. The method of Claim 16, further comprising the step of transmitting responsive control packets only in the time slot assigned to the node transmitting requesting control packets.

19. In a communication system that includes a plurality of nodes, a plurality of radio channels including a control channel and a plurality of data channels, each of the nodes capable of transmitting or receiving packets of data from another one of the nodes over one of the radio channels, the control channel being available for transmissions of requesting and responsive control packets from any of the plurality of nodes, a method of controlling access to the control channel in order to minimize collisions between control packets comprising the steps of:

- (a) dividing the control channels into a series of time slots;
- (b) providing a plurality of mini-slots at the beginning of each time slot;
- (c) assigning each of the mini-slots in each time slot to one of the plurality of nodes;
- (d) transmitting requesting control packets only during the mini-slot assigned to the transmitting node.

20. The method of Claim 19, wherein the number of mini-slots in a time slot equals the number of nodes and the step of assigning each of the mini-slots comprises cyclically rotating the assignment of mini-slots from one time slot to the next time slot.

21. A communication system comprising:

a plurality of nodes, each of said nodes including a means for transmitting and a means for receiving data packets;

a plurality of radio channels, one of said radio channels designated a control channel said control channel being available for transmissions of control packets from any of the plurality of nodes, said nodes monitoring the control packets for information regarding the availability of said radio channels; and

means for controlling access to the control channel in order to minimize collisions between control packets, said means for controlling access permitting a node to transmit a control packet over the control channel following a predetermined amount of time after the receipt of a control packet transmitted over the control channel, the predetermined amount of time sufficient to allow the node intended to receive the control packet to transmit a responsive control packet.

22. A method of communicating between a pair of nodes in a communication network that includes a plurality of nodes communicating over a radio channel, the method comprising the steps of:

- (a) monitoring the radio channel to determine the availability of the radio channel;
- (b) negotiating an agreement between the pair of nodes over the radio channel to conduct communications over the radio channel;
- (c) conducting communications between the pair of nodes over the radio channel;
- (d) releasing the radio channel; and
- (e) informing the others of the plurality of nodes upon completion of communications that the radio channel has been released.

23. The method of Claim 22, wherein the step of negotiating comprises the steps of broadcasting a request to communicate over the radio channel from a first one of the pair of nodes to a second one of the pair of nodes, and broadcasting a response to the request from the second node to the first node.

24. The method of Claim 22, wherein the step of informing comprises the steps of: broadcasting a request to release the radio channel from a first one of the pair of nodes to a second one of the pair of nodes, and broadcasting a response to the request to release from the second node to the first node.



25. The method of Claim 23, further comprising a method of controlling access to the radio channel comprising the steps of:

dividing the radio channel into a series of time frames;  
dividing the time frames into a plurality of time slots;  
assigning each of the plurality of time slots to one of the plurality of nodes; and  
broadcasting requests to communicate over the radio channel only in the time slot assigned to the transmitting node.

26. A method of controlling access to a radio channel in a communication system that includes a plurality of nodes communicating over the radio channel comprising the steps of:

receiving at one of the plurality of nodes requiring access to the radio channel a control packet indicating the completion of data exchange over the channel;

transmitting a control packet requesting access to the radio channel in order to communicate with another node from the node requiring access following a predetermined amount of time after the receipt of the control packet indicating the completion of data exchange, the predetermined amount of time being sufficient to allow the node intended to receive the control packet to transmit a responsive control packet.

27. The method of Claim 26, further comprising the steps of:  
dividing the radio channel into a plurality of time slots;  
providing a plurality of mini-slots at the beginning of each time slot;  
assigning each of the mini-slots in each time slot to one of the plurality of nodes;  
and

transmitting the control packet requesting access to the radio channel only during  
the mini-slot assigned to the node requiring access.

28. The method of Claim 27, wherein the step of assigning is based on the  
priority of the control packet to be transmitted by the node.

29. A method of controlling access to a radio channel in a communication  
system that includes a plurality of nodes communicating over the radio channel, the radio  
channel being available for transmissions of messages from any of the plurality of nodes,  
the method comprising the steps of:

- (a) dividing the radio channel into a series of time slots;
- (b) providing a plurality of mini-slots at the beginning of each time slot;
- (c) assigning each of the mini-slots in each time slot to one of the plurality of  
nodes; and
- (d) transmitting a request for access to the radio channel, from a node having a  
message to deliver to another one of the plurality of nodes, only during the mini-slot  
assigned to the transmitting node, prior to delivering the message.

30. The method of Claim 29, wherein the number of mini-slots in a time slot equals the number of nodes and the step of assigning each of the mini-slots comprises cyclically rotating the assignment of mini-slots to nodes from one time slot to the next time slot.

31. In a method of communicating in a communication system that includes a plurality of nodes that transmit messages over a radio channel, including a source node having a message to deliver to a destination node the improvement comprising the step of broadcasting from the source node over the radio channel a request for access to the radio channel to the destination node prior to broadcasting the message.

32. A method of prioritizing connection requests in a communication network that includes a plurality of nodes communicating over a radio channel, comprising the steps of:

- (a) providing a plurality of connection requests to one of the plurality of nodes, each request identifying a destination node to be connected to;
- (b) assigning a set of parameters to each connection request; and
- (c) ranking the each one of the plurality of the connection requests based on the values of each assigned parameter; and
- (d) transmitting the highest priority connection request.

33. The method of Claim 32, wherein one parameter included in the set of parameters is the urgency of the connection request.

34. The method of Claim 32, wherein one parameter included in the set of parameters is the importance of transmitting the connection request.

35. The method of Claim 32, wherein one parameter included in the set of parameters is the age of the connection request.

36. The method of Claim 35, further comprising the step of removing from the node connection requests that have exceeded a maximum lifetime.

37. The method of Claim 32, wherein one parameter included in the set of parameters is the importance of the connection request relative to other connection requests.

38. The method of Claim 32, wherein the step of ranking includes the step of considering whether the destination node to be connected to is busy.

39. The method of Claim 32, wherein a lower priority connection request may be transmitted before a higher priority connection request if the transmission of the lower priority request does not violate the service deadline of the higher priority packet.